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# Renewable Energy Support to Integrating Renewable Energy in Grid Code

# TERMS OF REFERENCE

## 1. BACKGROUND

*<Country background on power sector, rationale for the project, government objectives, project history on grid codes in country, policy framework and institutional arrangement for implementation.>*

## 2. OBJECTIVES

*<General Notes: Typical project objectives of an assignment may include the following: sector and strategy studies or assessments, project management and implementation supervision, collection and data analysis, etc.>*

The [donor] is providing technical assistance to the government and relevant power sector stakeholders on sustainable renewable market development, and achieving adequate supply security and reliability.

The general objective of this assignment is to provide advice and support the [committee in charge of grid codes] in updating the [country] grid code to enable the reliable integration of variable renewable energy (VRE). For the purpose of this assignment, VRE will include only wind power of any size and solar photovoltaic of any size, whose connection point is subject to the provisions of the [country] grid code.

The specific objectives are to provide international practices and technical standards for VRE in grid codes or similar grid operational procedures, and advise on amendment to the [country] grid code that may be needed in the short- and medium term for the reliable and efficient integration of variable renewable power sources such as wind and solar power, which are expected to gradually increase their participation given the incentive mechanisms of the recently enacted [law on renewable energy].

This TORs describe the scope of work and deliverables for an international consultant (the Consultant) to be contracted by the [donor]. In the [country], the local counterpart will be the [committee in charge of grid codes], which includes representatives of the relevant power sector stakeholders and has the mandate to review and propose amendments to the [country] grid code.

## 3. SCOPE OF WORK

### Task 1 – Inception Report.

The Consultant will:

* Review conditions and procedures in the [country] grid code relevant to this assignment and to the role and rights of the [committee in charge of grid codes]. In particular, the Consultant will review the [country] grid code, the section on grid connection requirements, the chapter on frequency control and voltage control, the section on scheduling and dispatch, and the chapter on connection requirements for variable renewable energy (VRE) technologies.
* Review the procurement plan for ancillary services
* Review the [law on renewable energy].
* Identify in the [country] grid code, key issues and provisions on reliability standards, connections and operational planning and reserves, and provide recommendations on international practices and provisions in grid codes to enable the reliable integration of variable VRE.

Based on this review, the Consultant will prepare a draft Inception Report on the [country] grid code and international practices in grid codes related to VRE.

The Consultant will travel to [city] to present to work with the [committee in charge of grid codes] in a roundtable, discuss and receive feedback, and collect additional information, including [committee in charge of grid codes] proposed amendments related to RE, if any, and directly related to this assignment.

Based on the results of the trip to [city], the Consultant will finalize and submit the Inception Report.

***Deliverable***: Inception Report covering the scope of work in Task 1, in particular identifying the key issues in the assessment and recommendations, a summary of international practices, plus a detailed workplan for this assignment.

### Task 2 - Draft Final Report and Workshop.

Based on Task 1 assessment and deliverable, and relevant international practices, the Consultant will:

* Review and recommend for wind power: technical and performance standards, connection standards, connection impact studies, operational planning and coordination arrangements, and other good practices that should be addressed in a grid code for the reliable integration of VRE
* Prepare a paper on international practices for VRE in grid codes, including their rationales;
* Review the [committee in charge of grid codes]’s draft proposed amendments related to VRE and provide advise;
* For VRE whose connection point is not in the scope of the [country] grid code, propose amendments in the [country] grid code on information sharing (e.g. production for forecasting and scheduling purposes) with distribution utilities and that needs be addressed by other codes (e.g. distribution code);
* Prepare recommendations on grid connection requirements for VRE, for the [committee in charge of grid codes] to consider and develop proposed revisions in the [country] grid code;
* Prepare recommendations on changes / enhancements to operational reserves to manage and address wind variability, for the [committee in charge of grid codes] to develop proposed revisions, as needed, to reserves in the [country] grid code;
* Prepare an Annex with representative provisions in international grid codes (or similar operational documents) regarding wind and solar power.

The Consultant will prepare a draft final report including the results of the assessment and the documents listed in the scope of work described above. The Consultant will travel to [city] to discuss with the [committee in charge of grid codes] the draft final report and deliver a workshop presenting the findings and recommendations of the report and international practices in grid code provisions for the connection, operation and integration of VRE, in particular wind generation, and recommendations for [country] grid code. The Consultant will collect feedback and comments from stakeholders in the workshop and from the [committee in charge of grid codes]. The [donor] team will also provide comments.

***Deliverable***:

* Draft final report
* Workshop on grid code provisions for Variable Renewable Energy.

### Task 3 Final Report.

Based on the comments and feedback collected during task 2, the Consultant will revise the draft final report and deliver the final report.

***Deliverable***:

* Final report

## 4. Deliverables and Indicative Timetable

The expected duration of this assignment is 6 months. The task is expected to require not more than 60 consultant-days.

The indicative timetable is:

• Inception Report delivered within 2 weeks after completing the first travel to [city];

• Draft final report;

• Final report, within two weeks after the second trip to [city].

## 5. Counterpart and Coordination

The Consultant will work for, report to and coordinate with the [donor] team. In the [country], the local counterpart will be the [committee in charge of grid codes]. For the purpose of ensuring adequate coordination, exchanges between the Consultant and the [committee in charge of grid codes] will be copied to the [donor] team.

In addition to comments from the [committee in charge of grid codes], the Consultant will receive comments from the [donor] team.

The Consultant will travel twice to [city], as described in the scope of work, each with duration of up to one working week. The dates of for each trip will be coordinated with the [donor] and the [committee in charge of grid codes].

## 6. Consultant Qualifications

The scope of work requires an individual expert to lead and carry out scope of work with the following qualifications for the expert:

• Knowledge and experience on international practices on procedures, performance standards and technical requirements for the connection and reliable operation of variable renewable energy;

• Good understanding of system operation and experience in development or review of grid codes;

• Experience in provisions in grid code for Variable Renewable Energy (VRE), in particular for wind and solar;

• Knowledge on wind and solar technological and operational capabilities;

• Relevant experience in [country] power sector would be an advantage;

• Good English writing and communication skills.